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SYNOPSIS

OF

CANADIAN FERNS AND FILICOID PLANTS.

BY

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HALIFAX, NOVA SCOTIA.

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SYNOPSIS

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CANADIAN FERNS AND FILICOID PLANTS.

The following Synopsis embraces a concise statement of what is known respecting Canadian ferns and filicoid plants. Imperfect as it is, I trust that it will prove useful to botanists and fern fanciers, and stimulate to renewed diligence in investigation. The whole number of species enumerated is 74. Of these 11 are doubtful. Farther investigation will probably lead to the elimination of several of the doubtful species, which are retained for the present with a view to promote inquiry; but a few additional species, as yet unknown within the boundaries of Canada, may be discovered. The above number (74) may be regarded, then, as a fair estimate—perhaps slightly in excess—of the actual number of ferns and filicoid plants existing in Canada. The number certainly known to exist, after deducting the species of doubtful occurrence, is 63.

The number of species described in Professor Asa Gray's exhaustive "Manual," as actually known to inhabit the northern United States, that is to say, the country lying to the south of the St Lawrence River and great lakes, stretching to and including Virginia and Kentucky in the south, and extending westward to the Mississippi River, is 75. This number does not include any doubtful species.

The number described in Dr Chapman's "Flora," as inhabiting the Southern States, that is, all the states south of Virginia and Kentucky and east of the Mississippi, is 69.*

* Mr D. C. Eaton, M.A., is author of that portion of Dr Chapman's "Flora" which relates to the ferns.

From these statements it will be seen that we have our due share of ferns in Canada.

The whole number of ferns in all the American States, and the British North American Provinces, is estimated, in a recent letter from Mr Eaton, as probably over 100.

In the British Islands there are about 60 ferns and filicoid plants. In islands of warmer regions the number is greatly increased. Thus Mr Eaton's Enumeration of the true ferns collected by Wright, Scott, and Hayes, in Cuba, embraces 357 species. The proportions of ferns to phanerogamous plants in the floras of different countries are thus indicated by Professor Balfour, in the "Class Book of Botany," page 998, § 1604:—"In the low plains of the great continents within the tropics ferns are to phanerogamous plants as 1 to 20; on the mountainous parts of the great continents, in the same latitudes as 1 to 8 or 1 to 6; in Congo as 1 to 27; in New Holland as 1 to 26. In small islands, dispersed over a wide ocean, the proportion of ferns increases; thus, while in Jamaica the proportion is 1 to 8, in Otaheite it is 1 to 4, and in St Helena and Ascension nearly 1 to 2. In the temperate Zone, Humboldt gives the proportion of ferns to phanerogamous plants as 1 to 70. In North America the proportion is 1 to 35; in France 1 to 58; in Germany 1 to 52; in the dry parts of South Italy as 1 to 74; and in Greece 1 to 84. In colder regions the proportion increases; that is to say, ferns decrease more slowly in number than phanerogamous plants. Thus, in Lapland, the proportion is 1 to 25; in Iceland 1 to 18; and in Greenland 1 to 12. The proportion is least in the middle temperate zone, and it increases both towards the equator and towards the poles; at the same time it must be remarked, that ferns reach their absolute maximum in the torrid zone, and their absolute minimum in the arctic zone."

Canada consists of a belt of land, lying to the north of the St Lawrence River and the great lakes. By these it is separated, along nearly the whole extent of its south-eastern and western boundaries, from the northern United States, which thus enclose Canada on two sides. A striking resemblance, amounting almost to identity, is therefore to be looked for in the floras of the two countries. Yet species appear in each that are absent in the other.

The species of ferns and filicoid plants which are certainly Canadian, number				63
Of these there inhabit the Northern States,				58
Do.	do.	Southern States,		38
Do.	do.	Europe,		36

The following table is designed to show some of the geographical relations of our Canadian ferns. The first column (I.) refers exclusively to the occurrence of the species within the Canadian boundary. The plus sign (+) indicates that the species is general, or at least does not show any decided tendency towards the extreme eastern or western, or northern or southern parts of the province. The letters N, S, E, W, &c., variously combined, indicate that the species is so limited to the corresponding northern, southern, eastern, or western parts of the province, or at least has a well-defined tendency to such limitation. The mark of interrogation (?) signifies doubt as to the occurrence of the species. The second column (II.) shows what Canadian species occur also in the Northern States, that is the region embraced by A. Grey's Manual; and the third column (III.) those that extend down south into Chapman's territory. The fourth column (IV.) shows the occurrence of our species in Europe; C in this column indicating Continental Europe, and B the British Islands. The fifth or last column (V.) shows the species that extend northwards into the Arctic circle—35 in all, of which, however, only 14, or perhaps 15, are known to be arctic in America. Am, As, Eu, and G indicate respectively Arctic America, Arctic Asia, Arctic Europe, and Arctic Greenland. The information contained in the last column has been chiefly derived from Dr Hooker's able Memoir in the Linnean Transactions (vol. xxiii. p. 251).

Hitherto no attention whatever has been paid, in Canada, to the study of those remarkable variations in form to which the species of ferns are so peculiarly liable. In Britain, the study of varieties has now been pursued by botanists so fully as to show that the phenomena which they present have a most important bearing upon many physiological and taxological questions of the greatest scientific interest. The varieties are studied in a systematic manner, and the laws of variation have been to a certain extent ascertained.

And as the astronomer can point out the existence of a planet before it has been seen, and the chemist can construct formulæ for organic compounds—members of homologous series—in anticipation of their actual discovery, so, in like manner the pteridologist now studies the variations of species by a comparative system, which enables him to look for equivalent forms in the corresponding species of different groups. Studies so pursued are calculated to evolve more accurate and definite notions as to the real nature of species, and the laws of divergence in form of which they are capable. I would therefore earnestly invite Canadian botanists to a more careful study of the *varieties* of the Canadian ferns, after the manner of Moore and other European leaders in this comparatively new path. The elasticity, or proneness to variation, of the species in certain groups of animals and plants has been somewhat rashly used to account for the origin of species, by what is called the process of variation. It seems to tell all the other way. Innumerable as are the grotesque variations of ferns, in forkings, and frillings, and tassellings, and abnormal veinings, &c. (see the figures in Moore's works), we do not know of a single species in which *such* peculiarities have become permanent or general, that is *specific*, so that the species can be traced back to such an origin; surely something of the kind would have happened had all species originated by a process of variation.

*Tabular View of the Distribution of Canadian Ferns and Allied Plants over certain parts of the Northern Hemisphere.**

NAME.	I.	II.	III.	IV.	V.
	Canada.	Northern States.	Southern States.	Europe.	Arctic Circle.
POLYPODIACEÆ.					
1. Polypodium vulgare, . . .	+	+	+	C.B.	Eu.
2. P. hexagonopterum, . . .	+	+	+	...	...
3. P. Phegopteris,	+	+	...	C.B.	Eu. G.
4. P. Dryopteris,	+	+	...	C.B.	Eu. Am. G.

* In the above Table, the doubtful species are included; but all reference to varieties is omitted.

NAME.	I.	II.	III.	IV.	V.
	Canada.	Northern States.	Southern States.	Europe.	Arctic Circle.
5. <i>P. Robertianum</i> ,	+	+	...	C.B.	...
6. <i>Adiantum pedatum</i> ,	+	+	+	...	...
7. <i>Pteris aquilina</i> ,	+	+	+	C.B.	Eu.
8. <i>Pellaea atropurpurea</i> ,	S.	+	+	...	...
9. <i>Allosorus Stelleri</i> ,	+	+	...	...	...
10. <i>Cryptogramma acrostichoides</i> ,	W.W.	...	...	?	Am.
11. <i>Struthiopteris germanica</i> ,	+	+	...	C.	Eu.
12. <i>Onoclea sensibilis</i> ,	+	+	+	...	...
13. <i>Asplenium Trichomanes</i> ,	+	+	+	C.B.	...
14. <i>A. viride</i> ,	N.E.	...	...	C.B.	Eu. G.
15. <i>A. angustifolium</i> ,	S.W.	+	+	...	...
16. <i>A. ebeneum</i> ,	+	+	+	...	...
17. <i>A. marinum</i> ,	E. ?	...	...	C.B.	...
18. <i>A. thelypteroides</i> ,	+	+	+	...	...
19. <i>A. montanum</i> ,	?	+	+	...	...
20. <i>A. Ruta-muraria</i> ,	?	+	+	C.B.	Eu.
21. <i>Athyrium Filix-femina</i> ,	+	+	+	C.B.	Eu.
22. <i>Woodwardia virginica</i> ,	S.W.	+	+	...	...
23. <i>Scolopendrium vulgare</i> ,	W.W.	+	...	C.B.	...
24. <i>Camptosorus rhizophyllus</i> ,	W.	+	+	...	...
25. <i>Lastrea dilatata</i> ,	+	+	+	C.B.	Eu. Am.
26. <i>L. marginalis</i> ,	+	+	+	...	...
27. <i>L. Filix-mas</i> ,	??	...	...	C.B.	Eu. G.
28. <i>L. cristata</i> ,	+	+	...	C.B.	...
29. <i>L. Goldieana</i> ,	W.	+	...	...	...
30. <i>L. fragrans</i> ,	N.W. ?	+	...	...	As. Am. G.
31. <i>L. Thelypteris</i> ,	+	+	+	C.B.	...
32. <i>L. Nov-Eboracensis</i> ,	+	+	+	...	...
33. <i>Polystichum angulare</i> ,	+	+	...	C.B.	Eu.
34. <i>P. Lonchitis</i> ,	N.W.	+	...	C.B.	Eu. Am. G.
35. <i>P. acrostichoides</i> ,	+	+	+	...	...
36. <i>Cystopteris fragilis</i> ,	+	+	+	C.B.	Eu. Am. G.
37. <i>C. bulbifera</i> ,	+	+	+	...	...
38. <i>Dennstaedtia punctilobula</i> ,	+	+	+	...	...
39. <i>Woodsia Ilvensis</i> ,	+	+	+	C.B.	{ Eu. As. Am. G.
40. <i>W. alpina</i> ,	+	...	...	C.B.	Eu. G.
41. <i>W. glabella</i> ,	+	+	...	...	Am.
42. <i>W. obtusa</i> ,	?	+	+	...	...
43. <i>Osmunda regalis</i> ,	+	+	+	C.B.	...
44. <i>O. cinnamomea</i> ,	+	+	+	...	...
45. <i>O. Claytoniana</i> ,	+	+	+	...	...
46. <i>Schizaea pusilla</i> ,	?	+	...	...	...

NAME.	I.	II.	III.	IV.	V.
	Canada.	Northern States.	Southern States.	Europe.	Arctic Circle.
OPHIOGLOSSACEÆ.					
47. <i>Botrychium virginicum</i> ,	+	+	+	...	Eu. G.
48. <i>B. lunarioides</i> ,	+	+	+	?	...
49. <i>B. Lunaria</i> ,	N.	...	...	C.B.	Eu. G.
50. <i>Ophioglossum vulgatum</i> ,	°	+	+	C.B.	Eu.
LYCOPODIACEÆ.					
51. <i>Plananthus Selago</i> ,	N.?	+	+	C.B.	{Eu. As. Am. G.
52. <i>P. lucidulus</i> ,	+	+	+	C.	...
53. <i>P. alopecuroides</i> ,	??	+	+	...	...
54. <i>P. inundatus</i> ,	+	+	+	C.B.	...
55. <i>Lycopodium clavatum</i> ,	+	+	+	C.B.	Eu. G.
56. <i>L. annotinum</i> ,	+	+	+	C.B.	Eu. Am. G.
57. <i>L. dendroideum</i> ,	+	+	+	...	...
58. <i>L. complanatum</i> ,	+	+	+	C.	Eu. As.
59. <i>Selaginella spinulosa</i> ,	N.E.	+	+	C.B.	Eu. G.
60. <i>Stachygynandrum rupestre</i> ,	+	+	+	...	...
61. <i>Diplostachyum apodum</i> ,	+	+	+	...	...
MARSILEACEÆ.					
62. <i>Azolla caroliniana</i> ,	S.	+	+	...	...
63. <i>Salvinia natans</i> ,	??	...	+	C.	...
64. <i>Isoetes lacustris</i> ,	+	+	+	C.B.	Eu. G.
EQUISETACEÆ.					
65. <i>Equisetum sylvaticum</i> ,	+	+	...	C.B.	Eu. Am. G.
66. <i>E. umbrosum</i> ,	+	+	...	C.B.	Eu.
67. <i>E. arvense</i> ,	+	+	...	C.B.	{Eu. As. Am. G.
68. <i>E. Telmateja</i> ,	W.	+	...	C.B.	...
69. <i>E. limosum</i> ,	+	+	...	C.B.	Eu.
70. <i>E. hyemale</i> ,	+	+	...	C.B.	Eu.
71. <i>E. robustum</i> ,	+	+	...	...	...
72. <i>E. variegatum</i> ,	N.E.	+	...	C.B.	{Eu. Am.? G.
73. <i>E. scirpoides</i> ,	+	+	...	C.	{Eu. As. Am. G.
74. <i>E. palustre</i> ,	N.	...	...	C.B.	Eu. Am.

Nat. Ord. POLYPODIACEÆ.

POLYPODIUM.

P. vulgare, Linn.—Fronde linear-oblong or somewhat lanceolate, more or less acuminate, deeply pinnatifid, in some forms almost pinnate; lobes (or pinnæ) linear-oblong, obtuse, often acute, rarely acuminate, entire or erenate or serrate; sori large; very variable as regards outline of the frond, form, &c., of the lobes, and serrature. *P. vulgare*, Linn., A. Gray, Moore, &c. *P. virginianum* of English gardens. *P. vulgare*, var. *americanum*, Hook., Torrey Fl. N. Y., ii. 480.—On rocks in the woods, not rare around the city of Kingston; abundant on the rocky banks of the St Lawrence, in Pittsburg; in the woods at Collins's Bay; and on Judge Malloch's farm, a mile west from Brockville; Gananoque lakes and rivers; Farmersville; Newboro-on-Rideau; Toronto; on the great boulder of the Trent Valley, near Trenton; on rocks west from Brockville, outcrop of Potsdam Sandstone at Oxford, and Hull mountains near Chelsea, C.E., B. Billings, jr.; near Catineau Mills, D. McGillivray, M.D.; Mount Johnson, C.E., and Niagara River, P. W. MacLagan, M.D.; Brighton, in the crevice of a rock in a field, and abundant on rocky banks, right bank of the Moira, above Belleville, J. Macoun; Ramsay, Rev. J. K. M'Morine, M.A.; north-west from Granite Point, Lake Superior, R. Bell, jr.; mountain top, near Mr Brydges's house, Hamilton, C.W., Judge Logie; River Rouge and lower end of Gut Lake, W. S. M. D'Urban; Cape Haldimand, Gaspé, John Beil, B.A.; Red River Settlement, Governor M'Tavish; Pied du cap Tourmente, M. L'Abbé Provancher; L'Orignal and Grenville, C.E., J. Bell B.A. The habitats above cited show that although this fern is not so common in Canada as in Britain, it is nevertheless widely distributed. It is common in New York State, according to Professor Torrey; and in the Northern States generally, according to Professor Asa Gray; rarer in the South, according to Dr Chapman.

P. hexagonopterum, Mich.—Fronde triangular in outline, acuminate, pinnate, hairy throughout; pinnæ broadly lanceolate, pinnatifid; lowest pair of pinnæ larger than the others, not deflexed; lobes of the pinnæ linear-oblong or lanceolate, strongly toothed, or almost pinnatifid. The decurrent pinnæ have a tendency to form conspicuous irregular angled wings along the rachis. Stipe not scaly except at the base. Rhizome long, slender, ramifying. Whole plant much larger than *P. Phegopteris*, and quite a different species. *P. hexagonopterum*, Michx., A. Gray, &c. The figure in Lowe's Ferns, vol. i. p. 143, tab. 49, is a little too much like *Phegopteris*. *P. Phegopteris* γ. *majus*, Hook. Fl. Bor. Amer., ii. p. 258. Hooker's β. *intermedia* of *Phegopteris* is *connectile*, Willd., which A. Gray refers to *P. Phegopteris*, L. *Phegopteris hexagonoptera*, J. Sm. Cat., p. 17.—Canada, Goldie in Hook. Fl. B. Amer.; Chippawa, C. W., P. W. MacLagan, M.D.; Mirwin's Woods, near Prescott, rare, B. Billings, jr.; near Westminster Pond, London, W. Saunders. Not by any means so general in Canada as in New York State, where, Professor Torrey states, it is common.

P. Phegopteris, Linn.—Fronde acutely triangular in outline, acumi-

nate, pinnate; the pinnae linear-lanceolate, pinnatifid, lowest pair deflexed; lobes of the pinnae oblong, setae shaped, obtuse, approximate, entire; rachis hairy and minutely scaly to the apex of the frond, as well as the mid-ribs of the pinnae. *P. Phlegopteris*, Linn., A. Gray, Moore, &c. *Phlegopteris vulgaris*, J. Sm. *P. connexile*, Michx., Pursh Fl. Am. Sept., ed. 2, vol. ii. p. 659.—Canada, Hooker; Black Lead Falls and De Salaberry, west line, W. S. M. D'Urban; Ramsay, Rev. J. K. M'Morine, M.A.; Nicolet, P. W. MacLagan, M.D.; Prescott, damp woods, not common, Osgood Station of the Ottawa and Prescott Railway, also Gloucester, near Ottawa, growing on the side of a ravine, and Chelsea, C.E., B. Billings, Jr; opposite Grand Island, Lake Superior, R. Bell, jr.; L'Original and Harrington, J. Bell, B.A.

P. Dryopteris, Linn.—Frond thin, light-green, pentangular in outline, consisting of three divaricate triangular subdivisions, each of which is pinnate, with its pinnae more or less deeply pinnatifid; pinnules oblong, obtuse, nearly entire; stipe slender and weak, not glandulose. *P. Dryopteris*, Linn., A. Gray, Moore, &c. *Phlegopteris Dryopteris*, J. Sm.—Abundant in the woods around Kingston; Ramsay, Rev. J. K. M'Morine, M.A.; very common in woods about Prescott, B. Billings, jr.; Montreal and Nicolet Rivers, C.E., P. W. MacLagan, M.D.; Belleville, common in the woods, J. Macoun; opposite Grand Island, Lake Superior, R. Bell, jr.; River Rouge, Round Lake, Montreal, De Salaberry, west line, and Black Lead Falls, W. S. M. D'Urban; Newfoundland, Labrador; Somerset and St Joachim, M. L'Abbé Provancher; L'Original, J. Bell, B.A.

Var. β. erectum.—Frond erect, rigid, with a very stout and very long glabrous stipe (18 inches long); beech woods at Collins's Bay, near Kingston, with the normal form. This variety resembles *P. Robertsonium* in general aspect, but is not at all glandulose.

P. Robertsonium, Hoffman.—A stouter plant than *P. Dryopteris*, fronds more rigid and erect; rachis, &c., closely beset with minute-stalked glands. *P. Robertsonium*, Hoffman, Moore, &c. *P. calcareum*, Sm. *P. Dryopteris*, var. *calcareum*, A. Gray.—Canada, Moore and other authors; United States, Gray and others. This species is commonly spoken and written of as a Canadian Fern. Not having had an opportunity of seeing Canadian specimens, I cannot cite special habitats. The minutely glandulose rachis serves at once to distinguish it.

ADIANTUM.

A. pedatum, Linn.—Stipe black and shining, erect, forked at top, the forks secondarily branched, the branches bearing oblique triangular oblong pinnules. *A. pedatum*, Linn., A. Gray, &c., Lowe's Ferns, vol. iii. pl. 14. Abundant in vegetable soil in the woods around Kingston; woods around the iron mines at Newboro-on-the-Rideau; Farmersville; Toronto; Montreal, Chippawa, Wolfe Island, and Malden, P. W. MacLagan, M.D.; Belleville, in rich woods, abundant, J. Macoun; Ramsay, Rev. J. K. M'Morine, M.A.; Ke-we-naw Point, R. Bell, jr.; at the Sulphur Spring, and common everywhere about Hamilton, Judge Logie; Lake Huron, Hook, Fl. B. A.; De Salaberry, west line, W. S. M. D'Urban; on the Gatineau, near Gilmour's rafting ground, D.

McGillivray, M.D.; London, W. Saunders; St Joachim and Isle St Paul, Montreal, M. L'Abbé Provancher; West Hawkesbury and Grenville, C.E., J. Bell, B.A. Apparently common everywhere in Upper Canada. I cannot speak so definitely of the Lower Province. This is one of our finest Canadian ferns; "the most graceful and delicate of North American ferns," says Torrey. It is easily cultivated. Fine as it is in the Canadian woods, I have specimens even more handsome from Schooley's Mountains (A. O. Brodie, Ceylon Civil Service); their fan-like fronds spread out in a semicircle, with a radius of 2½ feet. It is not a variable species in Canada. T. Moore, in "Index Filicum," gives its distribution as N. and N.W. America, California to Sitka, North India, Sikkim, Nepal, Gurwhal, Simla, Kumaon, Japan. There is a var. *β. aleuticum*, Rupr., in the Aleutian Islands.

PTERIS.

Pt. aquilina, Linn.—Stipe stout, 1 to 3 feet high, frond ternate, branches bipinnate, pinnules oblong lanceolate, sori continuous under their recurved margins. *Pt. aquilina*, Linn., A. Gray, Moore, &c.—Abundant on Dr Yates's farm in Pittsburg, and elsewhere about Kingston; Water-down Road, Hamilton, common, Judge Logie; Chippawa and Malden, C.W., P. W. MacLagan, M.D.; Ramsay, Rev. J. K. McMorine, M.A., Prescott, common, B. Billings, jr.; Belleville, very common on barren ridges, J. Macoun; Grand Island, Lake Superior, R. Bell, jr.; Red Lake River, also between Wild Rice and Red Lake Rivers, and Otter Tail Lake and River, between Snake Hill River and Pembina, &c., J. C. Schultz, M.D.; Black Lead Falls, and Portage to Bark Lake, W. S. M. D'Urban; Gatineau Mills, very common, D. McGillivray, M.D.; Lakefield, North Douro, Mrs Traill; New Brunswick, Hook. Fl. Bor. Amer.; L'Original, J. Bell, B.A.; London, W. Saunders.

α. var. α.—Pinnules pinnatifid (the normal or typical form of Moore), Dr Yates's farm, Kingston.

β. integerrima.—Pinnules entire (a sub-variety), common in Canada and westward. There are various other sub-varieties, differing in size, pubescence, &c.

γ. acipiens.—Frond bipinnate, thin and membranous, lanuginose, pinnules pinnatifidly toothed, or, in small forms, entire, barren; L'Anse à Cabielle, Gaspé, John Bell, B.A. This is a very remarkable fern, resembling a Lastrea, and in the absence of fructification, it is doubtfully referred to *Pteris aquilina*, yet the venation seems to indicate that it belongs to that species, which is remarkable for its puzzling forms. Being at a loss what to make of this fern, I sent it to Mr D. C. Eaton, M.A., who is justly looked up to by American botanists as our best authority on American ferns, and he likewise failed to recognise it. I hope some visitor to Gaspé will endeavour to obtain it in a fertile state, and thus relieve the doubt.*

[Var. *δ. caudata* appears occasionally in lists. I have as yet no satisfactory evidence of its occurrence in Canada proper. The nearest

Since the above was written, I have had an opportunity of studying the forms and development of *Pteris aquilina*, and am quite satisfied that the doubtful plant is a state of that species, not old enough to be fertile.

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approach to it is a specimen from the Hudson's Bay territories, probably from the Red River District (Governor M^rTavish). In the South it is a very distinct form, of which there are beautiful specimens in Wright's Cuban Plants (No. 872), and is very close to the *Pteris esculenta* of Australia.]

PELLÆA.

P. atropurpurea, Link.—Stipe and rachis almost black, shining, 6 to 12 inches high, frond coriaceous, pinnate, divisions opposite, linear-oblong or somewhat oval. *Pteris atropurpurea*, Linn. *Platyloma atrop.*, J. Sm., Torr. Fl. N. Y., ii. p. 488. *Allosorus atropurpureus*, A. Gray. *Pellaea atropurpurea*, Link., Fée, J. Sm. in Cat., Eaton.—Niagara River, at the Whirlpool, three miles below the Falls. This fern seems to retain its fronds all winter, for I have fertile specimens in a fine state, collected at the Whirlpool at the end of February 1859 by A. O. Brodie. Dr P. W. MacLagan has also collected it there. It is not common anywhere on the American Continent so far as I can learn. Mr Lowe speaks of it as in cultivation in Britain, "an evergreen frame or greenhouse species, not sufficiently hardy to stand over winter's cold." There must be some other reason for want of success in its cultivation in Britain.

ALLOSORUS.

A. Stelleri Ruprecht.—Fronds pale-green, thin and papery, 3 to 9 inches long, bipinnate or tripinnate, some of the smaller barren fronds scarcely more than pinnate; pinnae five or six pairs; lobes of the barren frond, rounded, oval, veiny; of the fertile frond, much narrower, linear-lanceolate, firmer; sori at the tips of the forked veins along the margins, stipe red, whole plant glabrous. A beautiful and delicate fern, growing in the crevices of rocks, rare. *Allosorus Stelleri*, Ledeb. Fl. Rossica. *Allosorus gracilis*, Presl., A. Gray, Torrey Fl. N. Y. ii. p. 487. In a letter from Mr T. Moore (1857), he mentioned to me that he had learned from specimens from Dr Regel, St Petersburg, that "the North American *Allosorus gracilis* was the old *Pteris Stelleri* of Amman, so that it spreads from North America through Siberia to India, whence Dr Hooker has it." *Allosorus minutus*, Turcz. Pl. Exs. *Cheilanthes gracilis*, Klf. *Cryptogramma gracilis*, Torrey. *Pteris Stelleri*, Gmelin. *Pteris minuta*, Turcz. Cat. Pl. Baik. Dah. *Pt. gracilis*, Michaux.—Near Lakefield, North Douro, C.W., on rocks, Mrs Traill; abundant in crevices of limestone rocks, on the rocky banks of the Moira, Belleville, Co. Hastings, J. Macoun; Lake of Three Mountains, W. S. M. D'Urban; Canada to the Saskatchewan, Hook. Fl. Bor. Am.; Dartmouth, Gaspé, John Bell, B.A. This is a northern species, and rare in the United States.

CRYPTOGRAMMA.

C. acrostichoides, R. Br.—"Remarkable for its sporangia extending far down on the oblique veins, so as to form linear lines of fruit." I have not seen the plant. It is referred by Sir William Hooker to *Allosorus crispus* (A. Gr. in Enum. of Dr Parry's Rely. Mtn. Plants). *Cryptogramma acrostichoides*, R. Br., Moore. *Allosorus acrostichoides*, A. Gr.—Isle Royale, Lake Superior. Placed in Dr Hocker's Table as a

Canadian species that does not extend into the United States. It has recently been found on the Rocky Mountains. *Allosorus crispus* is general throughout Europe, and occurs at Sitka, in North-West America. Mr Moore observes that the Eastern (Indian) species, *A. Brunonianus*, is very doubtfully distinct from the European plant.

STRUTHIOPTERIS.

S. germanica var. *β pennsylvanica*.—Rhizome stout, erect; fronds tufted; sterile ones large pinnate, erect-spreading, deeply pinnatifid; the fertile ones erect, rigid, with revolute contracted divisions, wholly covered on the back by sporangia. A very graceful fern, well suited for cultivation in gardens. *Struthiopteris pennsylvanica*, Willd., Pursh, J. Sm. Cat. *S. germanica*, Hooker, Torrey Fl. N. Y. ii. p. 486, Gray. *Osmunda Struthiopteris*, Linn.; *Onoclea Struthiopteris*, Schkr.; *Onoclea nodulosa*, Schkr., according to Hooker. Torrey refers *O. nodulosa*, Michx., to *Woodwardia angustifolia*.—Frankville, Kitley; Longpoint; Lansdowne; Hardwood Creek; usually found along the margins of creeks, &c.; common in rich, wet woods near Prescott, and abundant around Ottawa, B. Billings, jr.; low rich grounds, Belleville, abundant along Cold Creek, J. Macoun; Re-we-naw Point, Lake Superior, in low ground, at times under water, R. Bell, jr.; Ramsay, Rev. J. K. McMorine, M.A.; near Lakefield, North Douro, Mrs Traill; field beyond Watertown, Hamilton, Judge Logie; Osnabruck and Prescott Junction, Rev. E. M. Epstein; near Montreal, W. S. M. D'Urban; Assiniboine River, John C. Schultz, M.D.; Canada, to the Saskatchewan, Hook. Fl. Bor. A.; Pied du Tourmente, M. L'Abbé Provancher. This is the commonest plant in the Bedford Swamps; Gaspé and L'Orignal, J. Bell, B.A.; London, W. Saunders. Found in the western part of New York State, but rare according to Torrey.

ONOCLEA.

O. sensibilis, Linn.—Rhizome creeping; barren frond broad, leafy, deeply pinnatifid; fertile ones erect, spicate, contracted, doubly pinnate, with small revolute pinnules, enclosing the sporangia, not at all leafy. *Onoclea sensibilis*, Linn., A. Gr., J. Sm., &c. Lowe's Ferns, vol. vi. pl. 1.—In woods along the banks of the Little Cataraqui Creek in great abundance, and in moist swampy places in the woods in various other places about Kingston; west end of Loborough Lake; Becancour, M. L'Abbé Provancher; London, W. Saunders; common in marshy ground at Hamilton, Judge Logie; Lakefield, North Douro, Mrs Traill; St John's, C. E., Niagara and Malden, P. W. MacLagan, M.D.; Belleville, in low marshy places, abundant, J. Macoun; Ramsay, Rev. J. K. McMorine, M.A.; Amagos Creek, Lake Superior, R. Bell, jr.; Prescott, common, B. Billings, jr.; on the river shore, Gatineau Mills, D. McGillivray, M.D.; L'Anse au Coucou, Gaspé and L'Orignal, J. Bell; Nova Scotia. This curious fern has been cultivated in England since 1699; at Kew, since 1793. It is very variable as regards the outline and subdivision of the barren frond.

Var. *β bipinnata*.—Fronds bipinnate; perhaps not a constant form. Fertile fronds of this variety originated the *O. obtusilobata*, Schkr Pêche River, and near Cantley, Hull, D. McGillivray, M.D.

ASPLENIUM.

A. Trichomanes, Linn.—Fond small, narrow, linear, pinnate; pinnae roundish-oblong or oval, oblique, almost sessile, crenate; rachis blackish brown, shining, margined; sori distant from the midrib. *Asplenium Trichomanes*, Linn., Moore, Gray, &c., *Lowe's Ferns*, vol. v. pl. 22. *Asp. melanocaulon*, Willd., Pursh. *Fl. Sept. Americ.* ii. p. 666. *Asp. anceps*, Lowe.—Inhabits rocky river banks, &c., but is not common in Canada. On rocky banks, at Marble Rock, on the Gananoque River; Namainse, dry ground on the top of a mountain, R. Bell, jr.; rocky woodlands west from Brockville, rare. B. Billings, jr.; Montreal, Jones's Falls and Niagara, P. W. MacLagan, M.D.; Lake Medad, Hamilton, Judge Logie; Pittsburg, near Kingston, John Bell, B.A.; Pied du cap Tourmente, M. L'Abbé Provancher; near Belleville, J. Macoun.

β. delicatulum.—Fond narrower, pinnae much smaller, thinner, and wider apart than in the normal form. This is a sub-variety, passing by intermediate states into the typical plant, which is the common form of northern Europe. The variety is the prevalent form in Canada, but also occurs farther south in the United States, for I have specimens from Catskill (A. O. Brodie), and is not confined to the American continent, for Professor Caruel, the acute author of "*Flora Italiana*," sends specimens of a similar form from Florence. There is an *Asp. Trich.* var. *majus* in Cuba (according to Mr Eaton's Enumeration of Wright's Cuban ferns). *A. anceps* is a Madeiran form, not distinguishable, so far as I can see, from common European states of *A. Trichomanes*.

A. viride, Hudson.—Fond small, linear, pinnate; pinnae roundish-oblong or oval, more or less cuneate at base, slightly stalked, crenate or slightly lobed; rachis bright green; sori approximate to the midrib; in outline of frond and general aspect resembles the preceding species. *A. viride*, Hudson, *Flora Anglica*, 385; Sm., Bab., Moore, &c. *A. Trichomanes, β ram-sum*, Linn.—This beautiful alpine fern was found in Canada for the first time last summer, having been collected in considerable quantity at Gaspé, C.E., by John Bell, B.A., who formed one of a party of the Provincial Geological Survey. It was previously known to occur sparingly in N.W. America, at one spot on the Rocky Mountains, and in Greenland. Mr Bell's discovery of its occurrence in Gaspé is therefore extremely interesting in a geographical point of view. The Gaspé specimens although young, agree perfectly with the typical European form of *A. viride*, of which I have a full series of Scotch examples, as well as others collected in Norway by T. Anderon, M.D. In young specimens the pinnae are usually large, thin, and more cuneate and lobed than in the mature plant, in which they are roundish-ovate.

A. angustifolium, Michx.—Fond large (1 to 3 feet high), annual, lanceolate, pinnate; pinnae long, linear-lanceolate, acute; fertile fronds more contracted than the barren ones, "bearing sixty to eighty curved fruit dots on the upper branches of the pinnate forking veins," (Eaton). *A. angustifolium*, Michaux, A. Gray, Eaton, J. Smith, *Lowe's Ferns*, vol. v. pl. 24.—In Canada this fern appears to be confined to the extreme south-western point of the province; * Malden, P. W. MacLagan,

* Subsequently found in the Belleville district by Mr Macoun.

M.D.; at the Oil Wells, township of Enniskillen, Lady Alexander Russell. For information of the latter station I am indebted to the kindness of Judge Logie of Hamilton. This fern appears to be still rare in cultivation among the fern fanciers of Europe. It was introduced to Britain in 1812 by Mr John Lyon of Dundee.

A. beneum, Aiton.—Fond erect, lance-linear, pinnate; pinnae numerous, lanceolate (the lower oblong), sessile, slightly auricled at base and finely serrate; rachis blackish-brown, shining. *Asplenium beneum*, Aiton, Hortus Kewensis, ed. 2, vol. v. p. 516, Gray, Eaton, J. Smith, Lowe's Ferns, vol. v. pl. 2. *A. polypodioides*, Schkr.—Rocky woods, Brockville, B. Billings, jr.; the only locality in Canada from which I have seen specimens.* Although so rare with us, this species appears to be not uncommon in the United States. Gray speaks of it as "rather common;" I have specimens from Schooley's Mountains, West Point, N. Y., Providence, Philadelphia, &c. Judging from Mr Eaton's indication in Chapman's Flora, it again seems to decrease in the south, so that its present headquarters are in the Northern States.

[*A. marinum*, Linn.—Fond broad and leafy, linear-lanceolate, tapered above, pinnate; pinnae ovate-oblong or linear, oblique, shortly stalked, rarely pinnatifid, the upper ones confluent, stipe brownish, rachis brown below, green and winged above, sori large, linear, oblique; grows on rocks. *Asplenium marinum*, Linn., Moore, J. Smith, &c. *A. latum*, Hort.—New Brunswick, E. N. Kendal, in Hook. Fl. Bor. Am. I cannot learn that this fern has been subsequently found in North America, and hope, therefore, that botanists will look for it on the rocky shores of New Brunswick. It usually grows out of the crevices of shore cliffs, and is very limited in its geographical range, growing, according to Moore, only in the western part of Europe, crossing from Spain to Tangiers on the African coast, and being again met with in Madeira, the Azores, and Canary Isles.]

A. thelypteroides, Michaux.—Fronds large oblong-ovate, pinnate; pinnae lanceolate, acuminate, from a broad sessile base, and deeply pinnatifid, the lobes oblong, minutely toothed. *Asplenium thelypteroides* Michaux, Pursh, Bigelow, Torrey, Beek, Darlington, Gray, Eaton, *Diplazium thelypteroides*, Presl, J. Sm.—In rich woods, De Salaberry, west line, W. S. M. D'Urban; Mirwin's woods, &c., Prescott, B. Billings, jr.; Beloeil Mountain, P. W. MacLagan, M.D.; moist woods near the Hop Garden, Belleville, rare, J. Macoun (a deeply serrated, leafy form); Ramsay, J. K. McMorine, M.A.; St Joachim, M. L'Abbé Provancher; London, W. Saunders. Not a common fern in Canada; perhaps more plentiful in the United States. I have a fine series of specimens from Schooley's Mountains (A. O. Brodie), and others from Providence.

β. serratum.—Lobes of the pinnae ovate-oblong, approximate, strongly and incisely serrate. This may be regarded as a sub-variety.—Belleville, J. Macoun.

[*A. montanum*, Willd., which extends along the Alleghanies, has not yet been found in Canada, but may possibly occur. It grows on cliffs.]

[*A. Ruta-muraria*, Linn.—The wall-rue, a small species, which grows in the crevices of limestone cliffs in the Northern States, and is common

* Subsequently found near Belleville by Mr Macoun.

on stone walls and old buildings in Britain, is to be looked for in Canada.]

ATHYRIUM.

A. Filix-femina, R. Br.—Fronde ample (1-5 feet long), broadly oblong-lanceolate, bipinnate; pinnae also lanceolate; pinnules ovate-lanceolate or oblong, incisely toothed. Grows in large tufts, the fronds delicate, of a bright green hue. Lady Fern of the poets. *Athyrium Filix femina*, R. Br., Spreng., Roth., Hook., Moore, &c. *Aspidium Filix femina*, Swartz, Pursh, Beck. *Aspidium asplenoides*, Swartz, Willd., Pursh. *Asplenium Athyrium*, Schkr. *Asplenium Michauxii*, Spreng. *Asplenium Filix-femina*, A. Gray Man., p. 595. *Nephrodium asplenoides* and *Filix femina*, Michx. *Asplenium angustum*, Willd., Pursh.—Common in the woods, as near Kingstons, Toronto, Trenton, &c.; Pêche River, Ottawa, Dr M'Gillivray; Temiscouata, Chippawa and Malden, P. W. MacLagan, M.D.; Belleville, moist woods, very common, several varieties, J. Macoun; Ramsay, Rev. J. K. M'Morine, M.A.; mouth of the Awaganissis Brook, Gulf of St Lawrence, C.E., and Schibwah River, Lake Superior, R. Bell, jr.; Cemetery grounds, Hamilton, and on Prince's Island, Judge Logie; Hamilton's Farm and base of Silver Mt., W. S. M. D'Urban; Mountain Fall, H. B. T., Governor M'Tavish; Snake Hill River, John C. Schultz, M.D.; L'Anse à la Barbe, Gaspé and L'Orignal, John Bell, B.A.; St Tite, M. L'Abbé Provancher; London, W. Saunders.

β. angustum.—Fronde narrow, linear-lanceolate; pinnae rather crowded; pinnules not pinnatifid, but incisely toothed, with recurved margins; sori short, curved (*Aspidium angustum*, Willd.?)—Farmersville; Delta; Belleville, J. Macoun.

γ. rheticum.—Fronde rather small, firm, narrowly lanceolate in outline; pinnae more or less distant, and narrowly lanceolate; pinnules incisely toothed or deeply pinnatifid, linear, or more frequently lanceolate-acute, and acquiring a linear aspect from the reflection of the lobes, often crowded with confluent sori.—Dr Yates's farm, on the banks of the St Lawrence, near Kingston; near Montreal, Rev. E. M. Epstein, M.D.; near Lakefield, North Douro, Mrs Traill.

δ. rigidum.—Fronde small, rigid; pinnules approximate, connected at the base by a broad decurrent membrane, sori confined to the lower part of each pinnule.—Lakefield, North Douro, Mrs Traill.

There are other forms of this species, dependent in many cases, no doubt, upon situation; some with thin veiny fronds of great size, bearing few scattered sori. One form, very like the British var. *molle*, was gathered at Belleville by Mr Macoun. I know no fern more variable than this. Our Canadian forms require careful examination.

WOODWARDIA.

W. virginica, Willd.—Fronde pinnate; pinnae lanceolate, pinnatifid; sori arranged in line on either side of the midribs of pinnae and pinnules. *Woodwardia virginica*, Willd.; A. Gray Man. p. 593. (*Doodia*, R. Br.)—Millgrove Marsh, C.W., Judge Logie; sphagnous swamp near Heck's Mills, ten miles from Prescott, Augusta, C.W., B. Billings, jr.; Pelham, C.W., P. W. MacLagan, M.D.; Belleville, J. Macoun.

SCOLOPENDRIUM.

S. vulgare, Smith.—Fronds (in tufts) strap-shaped, with a cordate base, undivided, margin entire, stipe scaly. *Scolopendrium vulgare*, J. E. Smith, Bab. J. Sm., Moore, &c. *S. officinarum*, Swartz, Schkr., Gray Man., p. 593; Torr. Fl. N. Y. ii. p. 490. *S. Phyllitis*, Roth. *S. officinale*, DC. *S. Lingua*, Cavanilles. *Asplenium Scolopendrium*, Linn. Sp. Plantarum, &c. *A. elongatum*, Salisb. *Blechnum linguifolium*, Stokes. *Phyllitis Scolopendrium*, Newman.—Owen Sound, Georgian Bay, Lake Huron, on soft springy ground, amongst large stones, growing in tufts, abundant, 1861, Robert Bell, junior, C.E. This interesting addition to our list of Canadian ferns has been collected in the same place by the Rev. Prof. William Hincks, F.L.S. Mr Bell's specimens agree, in every respect, with the typical European form of the species, which is exceedingly variable. Only one station was previously known for this fern in all North America, viz., limestone rocks along Chittenango Creek, near the Falls, respecting which Professor Torrey observed:—"This fern is undoubtedly indigenous in the locality here given, which is the only place where it has hitherto been found in North America." It was first detected by Pursh, who found it in shady woods, among loose rocks in the western parts of New York, near Onondago, on the plantations of J. Geddis, Esq. This species (he said) I have seen in no other place but that here mentioned, neither have I had any information of its having been found in any other part of North America. (Pursh.) Nuttall states that he found it in the western part of the state, without giving the locality; but according to Dr Pickering, the specimens of Mr Nuttall, in the herbarium of the Academy of Sciences in Philadelphia, are marked, "Near Canandaigua, at Geddis's farm, in a shady wood, with *Taxus canadensis*," Torrey Fl. N. Y. ii. p. 490. This fern occurs throughout Europe, and also in Northern Asia. Mr Moore considers the Mexican *S. Lindenii* as a mere variety of this species. In Europe there are many remarkable varieties, of which Mr Moore has figured and described more than fifty that occur in Britain. The great beauty and remarkable character of many of these render them very suitable for cultivation. None of the abnormal forms have as yet been found in America, probably merely because they have not been looked for.

CAMPTOSORUS.

C. rhizophyllus, Presl.—Frond lanceolate, broad and hastate, or cordate at base, attenuated towards the tip, which strikes root and gives rise to a new plant; hence this fern is called the Walking Leaf; fronds evergreen. *Camptosorus rhizophyllus*, Link, Presl, A. Gray, Eaton, Hooker. *Asplenium rhizophyllum*, Linn. in part (Linnaeus's name included *Fadyenia prolifera*, a totally different plant), Michaux, Pursh Fl. Am. Sept. ii. p. 666, Bigelow, Torrey, Beck, Darlington, Lowe's Ferns, vol. v. pl. 14 a. *Antigramma rhizophylla*, J. Sm., Torrey Fl. N. Y. ii. p. 494. *Camptosorus ramificolius*, Link.—On the flat perpendicular face of a rock in the woods, on the Spike's Corner side of the mills at High Falls, township of Portland, C.W., July 1862. In a rocky wood, a mile north-west from the Oxford station of

the Ottawa and Prescott Railway, upon a rock slightly covered with mould, B. Billings, jr.; mountain side west from Hamilton, also at Ancaster and at Lake Medad, Judge Logie; Wolfe Island, E. J. Fox; not rare about Owen Sound, Rev. Prof. W. Hineks, F.L.S.; Montreal Mountain, M. L'Abbe Provancher; rather northern in its range in North America, but not common anywhere in Canada. This curious fern has been long in cultivation in the botanic gardens of Europe.

LASTREA.

L. dilatata, Presl.—Fronds spreading, broadly lanceolate, rather pale but vivid green, bipinnate; the pinnules pinnate or pinnatifid with pointed lobes; on the lower pinnae, the posterior pinnules are longer than the anterior ones; stipe with rather distant pale unicolorous scales; sori small. This description refers only to the commonest form in Canada. It is a very variable species. *Aspidium spinulosum*, Gray.—Abundant in the woods about Kingston, as Collins's Bay, &c., Smith's Falls, Odessa, woods near the Falls of Niagara, Hinchinbrook, Gananoque Lakes, Farmersville, Hardwood Creek, Delta, Upper Rideau Lake, Newboro-on-the-Rideau, Longpoint; Mouth of the Awaganissis Brook, Gulf of St Lawrence, Goulais River, also Grand Island, and at Ke-wenaw Point, Lake Superior, R. Bell, jr.; Ramsay, Rev. J. K. McMorine, M.A.; Prescott, very common, B. Billings, jr.; St John's, St Valentine, and Beloeil, P. W. MacLagan, M.D.; Belleville, very common, J. Macoun; St Joy Woods, W. S. M. D'Urban; Daniel's Harbour, Newfoundland, James Richardson (a peculiar form); Pêche River, Chelsea and Cantley, Hull, D. McGillivray, M.D. Of varieties referable to var. *Boottii*, Gray, var. *dumetorum*, Gray, or others, differing from the common (which, however, is perhaps not the typical) form, I have seen specimens from, or obtained information of their having been collected in, the following localities:—Malden, Brighton, Point Rich, Newfoundland, Hamilton's Farm, Murray, Hamilton, &c. These varieties still require careful study, with a view to their identification with European forms, which are now well understood.

B. tanacetifolia.—Frond large and very broad, triangular, tripinnate, with the pinnules pinnatifid or deeply incised, lobed. *P. tanacetifolium*, DC. ?—Pointe des Morts, Gaspé, John Bell, B.A. Mr Bell's specimen seems to agree well with Mr Moore's description of var. *tanacetifolia*. The typical *L. dilatata*, with dark-centred scales, so common in Scotland, I have not yet seen growing in the Canadian woods; but a fragment, the upper portion of a frond, from Point Rich, Newfoundland, James Richardson, looks like it.

L. marginalis, J. Smith.—Frond ovate-oblong, a foot, more or less, in length, bipinnate, pale green, somewhat coriaceous, lasting the winter; pinnae linear-lanceolate, broad at base; pinnules oblong, very obtuse, obsoletely incised; sori marginal; stipe of a pale cinnamon colour when old, with large thin pale scales profuse below. *L. marginalis*, J. Sm., *Aspidium marginale*, Swartz, Pursh, Bigelow, Beck, Darlington, Gray, Eaton, Lowe's Ferns, vol. vi., pl. 9 (a bad figure), Torrey Fl. N. Y. ii. p. 495. *Polypodium marginale*, Linn. *Nephrodium marginale*, Michaux.—This species is as common in the Canadian woods as *Lastrea Filix-mas* is in those of Britain; woods around Kingston, abundant;

near Odessa; Newboro-on the Rideau, along the course of the Gananoque River and lakes, in various places; very fine at Marble Rock; Farmerville; Hardwood Creek; Valley of the Trent, found on the great boulder, &c.; on Judge Malloch's farm and elsewhere about Brockville; on limestone rocks above the Rapids at Shaw's Mill, Lakefield, North Douro, Mrs. Traill; Sulphur Spring, Hamilton, Judge Logie; Cedar Island, A. T. Drummond, jr., B.A.; Smith's Falls, and Chippawa, P. W. MacLagan, M.D.; Ramsay, Rev. J. K. McMorine, M.A.; Prescott, common, B. Billings, jr.; Belleville, in rich low moist woods, common, J. Macoun; above Blacklead Falls, W. S. M. D'Urban; Gatineau Mills, D. McGillivray, M.D.; Cap Tourmente, M. L'Abbé Provancher; Harrington, J. Bell, B.A.; London, W. Saunders. This is exclusively an American fern. It varies in size and appearance; in some specimens the pinnae are wide apart, their divisions small and narrow; in others, the pinnae overlap each other, and their divisions are broad and leafy, also overlapping, and in such forms they are usually toothed into rounded lobes. Mr Macoun sends a form from Belleville, more deeply serrate than us.

β. Traillii.—Fronds very large (3½ feet long), bipinnate, all the pinnules pinnatifid.—Lakefield, North Douro, Mrs. Traill. This is a very handsome variety, and would form an attractive plant in cultivation. It has the same relation to the type of *L. marginalis* which *incisa* (*erosa*) has to typical *Filix-mas*.

Lastrea Filix-mas is erroneously referred to in some American works on Materia Medica as a common North American and Canadian fern. It has recently, however, been found on the Rocky Mountains by Dr Parry. Professor Gray says that Dr Parry's specimens are apparently identical with the European plant. Nothing like it occurs in Canada, so far as I can ascertain. Varieties of *L. marginalis* have been sent to me under the name of *Filix-mas*.

L. cristata, Presl.—Fronds erect, rigid, linear-oblong in outline, vivid green, pinnate or slightly bipinnate; pinnae triangular-lanceolate; pinnules large, oblong, approximate, decurrent; sori large, in a single series on each side of, and near to, the vein; stipe with few pale scales. *Lastrea cristata*, Presl, Moore, &c. *Polypodium cristatum*, Linn. *Aspidium cristatum*, Swartz, Willd., Pursh, E. B., Beck, Torrey Fl. N. Y., ii. p. 496, Gray. *Aspidium cristatum*, *β. lancastriense*, Torrey; *A. lancastriense*, Spreng., Bigelow, Beck, Darlington, Hooker.—Woods around Kingston; near the Pêche River, Gatineau, a tributary of the Ottawa, D. McGillivray, M.D.; Three Rivers, St John's, and Chippawa, P. W. MacLagan, M.D.; Sproule's Swamp, east from Belleville (a cedar swamp), not common, J. Macoun; Ramsay, Rev. J. K. McMorine, M.A.; Prescott, common, B. Billings, jr.; Lake of Three Mountains, W. S. M. D'Urban; Silver Brook, Gaspé, John Bell, B.A.; St Ferreol, M. L'Abbé Provancher; L'Orignal, J. Bell; London, W. Saunders.

L. Goldieana, J. Smith.—Frond very large (3 or 4 feet or more in length), dark green, bipinnate; pinnae 6 to 8 inches long, narrow, linear-lanceolate, not much attenuated towards the tips; pinnules (12–20 pairs), linear-oblong, approximate, uniformly curved forwards, scythe-shaped, sometimes with an extra lobe at base; sori small, near the midrib; stipe with pale shaggy scales above and larger dark-centred ones below; our largest Canadian fern, usually barren. *Lastrea Goldieana*, J. Smith. *Aspidium Goldieanum*, Hooker, Edin. New Phil. Jour. vi.

20 *Synopsis of Canadian Ferns and Filicoid Plants.*

p. 333, and Fl. Bor. Am., ii. p. 260, Gray. *Nephrodium Goldianum*, Hook. and Grav. *Aspidium Filix-mas*, Pursh, not of Willd.; &c.—Farmersville, in woods near the village, abundant and very fine, forming immense tufts; near Hamilton's Farm and De Salaberry, town line, W. S. M. D'Urban; Beloeil Mountain, Montreal and Malcen, P. W. MacLagan, M.D.; Belleville Woods, near Castleton; woods below Heely's Falls, west side, and in Simon Terrill's Woods, Brighton, J. Macoun. Augusta, Robert Jardine, B.A.; about Montreal, Mr Goldie in Hook. Fl. Bor. Am. London, W. Saunders. This fine fern was appropriately named by Sir William Hooker in honour of its discoverer, a successful investigator of Canadian botany, now resident at Paris, C.W. The species belongs exclusively to the American Continent. In Canada we have two sub-varieties:—

α. serrata, in which the divisions of the pinnae are coarsely serrate. Montreal.

β. integerrima, in which the divisions of the pinnae are almost or quite entire. Farmersville.

L. fragrans, Moore.—Frond 8 to 12 inches long, coriaceous, bipinnate, pinnae triangular, of few (4 or 5 pairs) of pinnules, which are crowded and covered beneath by the large rusty membranous indusia, which conceal the sori. Rachis with profuse, large, palish scales, especially near the base. *Aspidium fragrans*, Swartz, A. Gray.—Rocks, Penokee Iron Ridge, Lake Superior, Mr Laphan, and north-west—Professor Woods, in Class-Book; shaded trap rocks, Falls of the St Croix, Wisconsin, Dr Parry, and high northward, Gray's Manual. I have not yet seen Canadian specimens of this species, which is quite a northern fern, stretching along the northern shores of the Pacific to the Russian Arctic dominions. I have specimens from Repulse Bay, collected by Captain Rae's party while wintering there in 1855. This plant does not appear to be in cultivation in any European garden.

L. Thelypteris, Presl.—Frond erect, lanceolate, mostly broad at base, and narrowed upwards, thin, and herbaceous, or slightly coriaceous, glabrous or downy, pinnate; pinnae linear, rather distant, deeply pinnatifid; pinnules with revolute margins, veins forked, sori near their middle, becoming confluent. Stipe as long as, or longer than, the frond, and naked. *Lastrea Thelypteris*, Presl, Moore, J. Sm. *Aspidium Thelypteris*, Swartz, E. B. Willd., Pursh, Bigelow, Beck, Darlington, Torrey Fl. N. Y. ii. p. 496, A. Gray, Man. *Polypodium Thelypteris*, Linn. *Dryopteris Thelypteris*, A. Gr.—Swamps in the woods, Townships of Hinchinbrook, Portland, Ernestown, &c.; Millgrove Marsh, Hamilton, Judge Logie; Gatineau Mills on the Ottawa, D. McGillivray, M.D.; Prescott, common, B. Billing, jr.; Temiscouata, Thorold and Malden, P. W. MacLagan, M.D.; Belleville, very common in swamps, J. Macoun; Ramsay, Rev. J. K. M'Morine, M.A.; portage to Bark Lake, and on lumber road through the woods east from Hamilton's Farm, W. S. M. D'Urban, Montreal, Drs MacLagan and Epstein; Hudson's Bay Territories near Red River Settlement, Governor M'Tavish; St Joachim, M. L'Abbé Provancher; L'Orignal, J. Bell, B.A.; London, W. Saunders. In the State of New York this species is common in swamps and wet thickets (Torrey). I have it from West Point, N. Y. In the south, Eaton indicates Florida and northward. Very seldom found with fructification (Pursh). Fertile specimens are not rare with us.

The forked veins of the pinnules distinguish this species from the next. In the Canadian plant the outline of the frond is a little different from Scotch and Irish specimens, being less narrowed at base. There are three forms of this species in Canada. The first (α) seems to be the plant of Gray's Manual, the second (β) is more like the *L. Thelypteris* of Europe, and the third (γ) is intermediate between this species and the next.

a. pubescens.—Frond somewhat coriaceous, densely pubescent or downy throughout. Odessa, Hudson's Bay, &c.

β . glabra.—Frond thin, herbaceous, glabrous. Montreal, Chelsea, Hinchinbrook, &c.

γ . intermedia.—Frond narrowed below, glabrous; stipe slightly elongated (veins forked). Gaspé, J. Bell, B.A.

L. Nov-Eboracensis.—Frond lanceolate, narrow at the base, thin and herbaceous, pinnate; pinna linear or linear-lanceolate, more or less approximate, deeply pinnatifid; pinnules oblong, usually flat; veins simple (not forked); sori never confluent; stipe short, rachis, &c. downy, pinnules more or less distinctly ciliate. *Lastrea Novboracensis*, Presl; *Polypodium Novboracense*, Linn., Schk. *Aspidium thelypteroides*, Swartz. *Aspidium Novboracense*, Willd., A. Gray, Eaton—Pittsburg near Kingston; Lakefield, North Douro, Mrs Traill; Mountain side, Hamilton, Judge Logie; Prescott, common, B. Bellings, jr.; Mount Johnson, Montreal, and Beloeil, P. W. MacLagan, M.D.; Rapisuy, Rev. J. K. McMorine, M.A.; near Chelsea, D. McGillivray, M.D.; London, but not common, W. Saunders; L'Orignal, J. Bell. This fern belongs exclusively to the American Continent. It seems to be more abundant and more distinct in the United States than with us. In *Flora Boreali-Americana*, Sir William Hooker observed—"The *Aspidium Novboracense* is quite identical with *A. Thelypteris*." In the recently published volume of *Species Filicum* (which at present I can only quote at second hand), doubts are still expressed as to its being a species really distinct from *L. Thelypteris*. Mr Eaton and other American pteridologists think it quite distinct. Its most obvious characters are—(1.) The tapering form of the lower part of the frond (although there is also a form of *L. Thelypteris* having this peculiarity); (2.) sori few, mostly near the base of the pinnules, and not confluent, not overlapped by a recurved margin; (3.) veins of the pinnules simple, not forked. The outline of the frond must not be depended upon, as the Scotch and Irish *L. Thelypteris* is narrowed at the base like *L. Nov-Eboracensis*. This species is allied to *L. montana*, Moore (*Oreopteris*, Bory).

POLYSTICHUM.

P. angulare, β . Braunii.—Frond soft, herbaceous, lanceolate, bipinnate; pinnules stalked, serrate; the small teeth tipped by soft bristles; stipe and rachis scaly throughout. In the Canadian plant the scales of the rachis are larger than in the typical *P. angulare* of England, from which it may be specifically distinct. *Aspidium Braunii*, Spenner. *Aspidium aculeatum* var. *Braunii*, A. Gray, Man. Bot., p. 599, *A. aculeatum*, Provancher; Harrington, Cap Bon Ami and Dartmouth, N. York, Gaspé, John Bell, B.A.; base of Silver Mountain, W. S. M. D'Urban.

P. Lanchitia, Roth. — Frond rigid and shining, linear-lanceolate, simply pinnate; pinnae sessile-shaped, auricled, spinescent. *Polystichum Lanchitia*, Roth, Moore, J. Sm., &c. *Polypodium Lanchitia*, Linn. *Aspidium Lanchitia*, Swartz. Schk. — Limestone rocks Owen Sound, C.W., 1850, Rev. Professor William Hincks, F.L.S. Professor Hincks has kindly furnished me with specimens from the above locality Woods, southern shore of Lake Superior and north-westward, Professor Asa Gray, in Man. Bot., N.S.; British America, Professor Woods in Class-Book. It will be observed that Professor Hincks's station is the only definite Canadian one with which we are acquainted. Mr T. Drummond found this fern on the Rocky Mountains many years ago.

P. acrostichoides Schott. — Frond pale green, shining, long and narrow, linear-lanceolate, simply pinnate; pinnae long and narrow, linear-lanceolate, shortly stalked, auricled anteriorly at the base, more or less distinctly serrate, with hair-tipped teeth; fertile (upper) pinnae slightly contracted, covered beneath by the large confluent sori; stipe profusely chaffy, with pale scales. *Polystichum acrostichoides*, Schott, J. Sm. *Aspidium acrostichoides* Swartz, A. Gray, Eaton. *Aspid. auriculatum*, Schk. *Nephrodium acrostichoides*, Michx. — Abundant in the woods a few miles west from Kingston; also not rare in the woods of the Midland District of Canada generally; Upper Rideau Lake; woods around Toronto, Rev. Dr Barclay; Stanford, M. L'Abbé Provancher; L'Orignal, J. Bell; London, W. Saunders; Sulphur Spring, Hamilton, Judge Logie; Prescott, common, B. Billings, jr.; Nicolet and St Valentine, C.E., and Chippawa, C.W. P. W. MacLagan, M.D.; Belleville, very common in rocky woods, as in Hop Garden, J. Macoun; Ramsay, Rev. J. K. M'Morine, M.A.; hills and woods, portage to Bark Lake, W. S. M. D'Urban; Gilmour's Farm, Chelsea, D. McGillivray, M.D.; Osnabrock and Prescott Junction, Rev. E. M. Epstein. This species is exclusively American.

[*β incisum*: pinnae strongly serrate or incised into lobes. *Aspidium Schweinitzii*, Beck. This form, which I have from Schooley's Mountains, &c. (A. O. Brodie), will no doubt be found in Canada.]

CYSTOPTERIS.

C. fragilis, Bernhard. — Fronds delicate, green, lanceolate in outline, glabrous, bipinnate; pinnae and pinules ovate-lanceolate or oblong; the latter obtuse, incisely toothed, thin and veiny; sori large; stipe dark purple at the base. *Cystopteris fragilis*, Bernhardi, Hook., Bab., Moore, Newm., A. Gray. *Polypodium fragile*, Linn. *Cystopteris orientalis*, Desvaux. *Polypod. viridulum*, Desv. *Athyrium fragile*, Sadler. *Cyathea fragilis*, Sm. *C. cynapifolia* and *C. anthriscifolia*, Roth. *Cystea fragilis*, Sm. *Cyclopteris fragilis*, S. F. Gray. — Rocky woods and cliffs about Kingston, in various places, but not abundant; Farmersville; Mountain side, Hamilton, on moist rocks, Judge Logie; rocks by the bay shore, L'Anse au Cousin, and Dartmouth River, Gaspé, John Bell, B.A.; Mirwin's woods, Prescott, common, B. Billings, jr.; Montreal and Jones's Falls, P. W. MacLagan, M.D.; rocky banks of the Moira, rather rare, J. Macoun; Ramsay, Rev. J. K. M'Morine, M.A.; camp at base of Silver Mount, on rocks, also River Rouge, abundant, De Salaberry, west line, and at Black Lead Falls, W. S. M. D'Urban; St Joachim, M. L'Abbé Provancher; Grenville, C. E., John Bell, B.A.:

London, W. Saunders. In Dr Hooker's valuable Table of Arctic Distribution this plant is indicated as a Canadian species that does not enter the United States, where I presume arises from a misprint, as the species is not uncommon in the Northern States, and extends south to the Mountains of Carolina. The delicate *C. tenuis* is the form known in the south, but in Canada we have the stout typical European form of *C. fragilis*.

Bangsatata.—Pinnules incised, with long and spreading teeth. *Crest-ferry* var. *cupifolia*, J. Love.—Gaspé, John Bell, B.A. Specimens referable to this form were likewise gathered at Lake of Three Mountains by Mr D'Urban. Mr Bell's specimens agree perfectly with English specimens from Dr John Lowe (*C. f. cupifolia*). Italian specimens from Professor Carnel of Pisa, labeled "*Crest-ferry*," belong to this variety. Mr Bell has a fertile frond from Gaspé with very broad very pinnæ, deeply incised, but not pinnate.

C. bulbifera, Bernharti.—Frond thin, green, lanceolate or linear-lanceolate, bipinnate, bulbiferous towards the apex on the under surface; pinnæ oblong lanceolate, narrowed at the tips; pinnules oblong obtuse, incisely toothed; sori small, not very numerous; indusium small. Very variable in the size and form of the frond. *C. bulbifera*, Bernharti, A. Gray, J. Sm. *Aspidium bulbiferum*, Swartz, Seck. *Aspidium atomarium*, Muhl.—Moist swampy woods about Kingston, as Collins's Bay, Kingston Mills, &c.; abundant on Judge Malloch's farm, a mile west from Brockville; Petit Portage, &c., Gaspé, John Bell, B.A.; Wolfe Island, A. T. Drummond, B.A.; Mirwin's woods, Prescott, common; B. Billings, jr. (short form); Beloeil Mountain, P. W. MacLagan, M.D.; rocky banks of the Meira, Belleville, and in cedar swamps and wet woods, very common, J. Macoun; Ramsay, Rev. J. K. McMorine, M.A.; Mountain side, Hamilton, common; Judge Logie; Black Lead Falls, on limestone rock, W. S. M. D'Urban; Piel du cap Tourmente, M. L'abbé Provancher; Grenville, C. E. J. Bell; London, W. Saunders. There are two distinct forms or varieties of this species.

α. horizontalis.—Frond triangular lanceolate, broad at base, not more than three or four times longer than broad; pinnæ horizontal. Niagara Falls, within the spray, Collins's Bay, &c.

β. flagelliformis.—Frond linear, attenuated upwards, very long and narrow, six or seven times longer than broad; pinnæ less horizontal. Frankville, Montreal, Gaspé, &c.

DENNSTEDTIA.

D. punctilobula, Moore.—Frond broadly lanceolate, pale green, thin, with a stout rachis, bipinnate; the pinnules pinnatifid; sori minute, usually one on the anterior basal tooth of each lobe of the pinnule, which is reflexed over the sorus; the proper indusium is pale, cup-shaped, opening at top. Rhizome slender, creeping through the soil; whole plant glandular-downy. *Dennstedtia* (Bernharti, 1800) *punctilobula*, Moore, Index Filicum, p. xcvii. *Dicksonia punctilobula*, Hooker, A. Gray, J. Sm. *D. pilosiuscula*, Willd., Hook. Fl. Bor. Amer. *Nephrodium punctilobulum*, Michx. *Aspidium punctilobulum*, Swartz. *Putania*, Presl. *Dicksonia pubescens*, Schkr. *Sitobium pilosiusculum*, Desv., J. Sm. Gen. Fil.—Pittsburg near Kingston, John Bell, B.A.; River Rouge, W. S. M. D'Urban; Montreal, P. W. MacLagan, M.D.; Prescott, on Dr Jessup's moist pasture land, B. Billings, jr.; New

Brunswick, E. N. Kendal, in Hook. Fl. Bor. Amer.; Ramsay, Rev. J. K. McMorine. Mr Eaton has mentioned to me that the drying fronds have the odour of new hay.

WOODSIA.

W. Ilvensis, R. Br.—Fronde lanceolate, usually 4 or 5 inches long, bipinnate, or nearly so, pinnae approximate, pinnules oblong, obtuse, stipe (red), rachis, and whole lower surface of the frond clothed with chaffy scales, which are rusty at maturity. Sori usually confluent around the margins of the pinnules. First observed in the Isle of Elba (Ilva), hence named, after Dalechamp, *Acrostichum Ilvense*, by Linnaeus, whose Phoenix was very wroth therent; see English Flora, vol. iv. p. 323. *Woodsia Ilvensis*, R. Br., Hook., Moore, J. Sm., Gray, &c. *Nephrodium laosum*, Michx.—Abundant on the ridge of Laurentian rocks at Kingston Mills; Rocks west from Brockville and at Chelsea, B. Billings, jr.; Mount Johnson and Beloeil Mountain, P. W. MacLagan, M.D.; mountain gneiss rocks, opposite Rouge River, W. S. M. D'Urban. I have likewise specimens from the Hudson's Bay territories (Governor McTavish), but without special locality. On rocks, Canada, Pursh; Canada to Hudson's Bay, Hook. Fl. B. A.; Pied du cap Tourmente, M. L'Abbé Provancher. I think our plant must be much larger and more scaly than the European one. A tuft which I have from Catskill Mountains (A. O. Brodie) has richly fruited fronds a foot long and 2 inches wide. (I find that large American forms of this species have been mistaken for *W. obtusa*. The involucre, which is large and not split into hairs in the latter species, serves readily to distinguish it.) Much of the *Ilvensis* in cultivation in Europe is probably the American form.

β. *gracilis*.—Fronde more slender, more hairy and less scaly than the type; pinnae rather distant, deeply pinnatifid, or partially pinnate. Dartmouth River, Caspé, John Bell. B.A. In technical characters, this form agrees better with *W. alpina* (*hyperborea*), but it has quite a different aspect.

W. alpina, S. F. Gray.—Fronde small (from 1 to 2 or 3 inches long), broadly linear, pinnate, somewhat hairy without distinct scales; pinnae ovate, somewhat triangular, obtuse, pinnatifidly divided into roundish lobes. *Woodsia alpina*, S. F. Gray, Brit. Pl., Moore. *Woodsia hyperborea*, R. Br. in Linn. Trans., vol. xi.; Pursh. Fl. Am. Sept. ii. p. 660.—In the clefts of rocks, Canada, Pursh; Canada to the Saskatchewan, Hooker. Noticed in Dr Hooker's Table of Arctic Plants as a Canadian species that does not extend into the American States.

W. glabella, R. Br.—Fronde a few (2-4) inches long, linear, bright-green and glabrous on both sides, simply pinnate; the pinnae short, rounded or rhombic, cut into rounded or wedged lobes. Stipe with a few scales at the base only. *Woodsia glabella*, R. Br., Hook. Fl. Boreali Americana, tab. 237; Gray. Canada, Professor Woods in Cl. Bk. Sir W. Hooker, in the Fl. B. Amer., gave Great Bear Lake as the only station then known for *W. glabella*. Mr D. C. Eaton has kindly furnished me with specimens from Willoughby Lake, Vermont (Goodale leg.), and Professor Gray notices its occurrence on rocks at Little Falls, New York (Vasey), and "high northward."

β. *Belli*.—Fronde larger (6-7 inches long); pinnae more elongated,

pinnatifidly incised into rounded lobes (bright green, glabrous). Gaspé, on the Dartmouth River, twenty miles from its mouth, John Bell, B.A.

W. obtusa, Torrey.—Frond nearly a foot long, linear-lanceolate, glandulose, bipinnate; pinnules slightly decurrent, oblong, obtuse, crenate, or somewhat pinnatifid; indusium large, enveloping the sorus, torn into a few marginal lobes; stipe with few scattered, pale, chaffy scales. *Woodsia obtusa*, Torrey, A. Gray, J. Sm. *Aspidium obtusum*, Willd. *Physenatum obtusum*, Hook. Fl. Bor. Am. *Woodsia Perriniana*, Hook. and Grev. Ic. Fil. *Polypodium obtusum*, Swartz.—An impression prevails that this plant, which is said to be common in the Northern States, especially towards the west, grows also in Canada. Mr D. C. Eaton, in the kindest manner, cut out of his own herbarium a specimen for me, from near High Bridge, New York city, in an excellent state for examination, which has enabled me to understand the species and to ascertain that we have as yet no satisfactory evidence of its occurrence in Canada. Large forms of *W. Ilvensis* have in some cases passed for it. (I introduce this notice of the plant with a view to promote farther inquiry.)

OSMUNDA.

O. regalis β . *spectabilis*.—Fronds erect, pale-green, glabrous, bipinnate; pinnules oblong-lanceolate, oblique, shortly stalked, very slightly dilated at the base, nearly entire; fertile pinnules forming a racemose panicle at the summit of the frond. *Osmunda spectabilis*, Willd., J. Smith. Farmersville; Hardwood Creek, Hinchinbrook, and other places in rear of Kingston, usually in thickety swamps, by corduroy roads, &c., Millgrove Marsh, Hamilton, Judge Logie; Ramsay, Rev. J. K. McMorine, M.A.; woods near the Hop Garden, Belleville, not common, J. Macoun; Prescott, common, B. Billings, jr.; around Metis Lake, &c.; opposite Gros Cap; also Sou-sou-wa-ga-mi Creek and Schibwah River, R. Bell, jr.; near Montreal, Rev. E. M. Epstein and W. S. M. D'Urban; mountain, Bonne Bay, Newfoundland, on rocks 1000 feet above the sea, James Richardson (a small form); Welland, J. A. Kemp, M.D.; Osnabruck and Prescott Junction, Rev. E. M. Epstein; Nicolet, Wolfe Island and Navy Island, P. W. MacLagan, M.D.; Lake St Charles, M. L'Abbé Provancher; Caledonia Springs and L'Orignal, J. Bell; Portland, Thos. R. Dupuis, M.D.; Bedford; London, W. Saunders. The fronds of our plant are a little more drawn out than those of the European one; the pinnules are often distinctly stalked, and the overlapping auricles either altogether absent or only slightly developed. This is *O. spectabilis*, Willd.; *O. regalis*, β . Linn. Sp. Pl. Some botanists distinguish two American forms, one agreeing with the typical *regalis* of Europe; but it is difficult to do so. The typical *O. regalis* is a larger, more robust, and more leafy plant, with more widely spreading or divergent pinnae, and more leafy auricled sessile pinnules, more or less pinnatifid at the base; in our Canadian plant they are quite entire. The divisions of the fertile portion of the pinnae are also more widely divergent in a *regalis*. The frond, moreover, is of a darker colour.

O. cinnamomea, Linn.—Sterile and fertile fronds distinct, the former ample, broadly lanceolate, pinnate; the pinnae rather deeply pinnatifid; lobes regular, entire; fertile frond contracted, erect, in the centre of the tuft of sterile fronds, and not at all foliaceous. Sporangia ferruginous.

Fertile frond decaying early in the summer. *Osmunda cinnamomea*, Linn., Gray, J. Sm. *O. Claytoniana*, Conrad, not of Linn.—Fairfield farm and elsewhere about Kingston, not uncommon; Millgrove Marsh, Hamilton, Judge Logie; Sandwich and Montreal, P. W. MacLagan, M.D.; opposite Gros Cap; also Two Heart River, Lake Superior, P. Bell, jr., C.E.; Belleville, swamps and low grounds, common, J. Macoun; Ramsay, Rev. J. K. McMorine, M.A.; St Joy Woods, on the river shore, near Gatineau Mills, D. McGillivray, M.D.; Newfoundland, Miss Brenton, in Hook. Fl. Bor. Am.; Prescott, common, B. Billings, jr.; Nicolet, M. L'Abbé Provancher; L'Orignal, J. Bell; near London, W. Saunders.

O. Claytoniana, Linn.—Frond narrowly lanceolate, pinnate; pinnae pinnate, about three pairs of pinnae near or below the middle of the frond contracted and fertile; sporangia brown, with green spores. This species, when fresh, has a strong odour, resembling that of rhubarb (Pieplant) stalks. *O. Claytoniana*, Linn., Gray, J. Sm. *O. interrupta*, Michaux.—Between Kingston and Kingston Mills, in wet swampy places by the roadside; Little Cataraqui Creek; Waterloo; banks of the Humber, near Toronto; Princes Island, Hamilton, Judge Logie; Ramsay, Rev. J. K. McMorine, M.A.; Ke-we-naw Point, in wet soil, R. Bell, jr.; Belleville, low rich grounds, not rare, J. Macoun; Prescott, common, B. Billings, jr.; Round Lake, W. S. M. D'Urban; Lake Settlement, and on the river shore near Gatineau Mills, D. McGillivray, M.D.; Newfoundland, Miss Brenton, in Hook. Fl. Bor. Am.; Osunbruck and Prescott Junction, Rev. Dr Epstein; on Judge Malloch's farm and elsewhere about Brockville; Dartmouth River, Gaspé, John Bell, B.A.; St Ferreol, M. L'Abbé Provancher. Abundant on uncleared land along the Bedford Road, where the dried fronds are used by the farmers as winter fodder for sheep. Augmentation of Grenville, C. E., J. Bell, B.A.; near Komoka, C.W., W. Saunders. This fern is common also in the Northern States. I have a lax form, with long stipes and remarkably short somewhat triangular pinnae, from Schooley's Mountains.

SCHIZÆA.

[*S. pusilla*, Pursh.—Newfoundland, De la Pylaie. I have no further information respecting its occurrence in British America. Professor A. Gray indicates its distribution in the United States thus:—"Low grounds, pine barrens of New Jersey, rare," which is not at all favourable to its being found in Newfoundland or Canada. Mr Eaton has sent me beautiful specimens from sandy swamps in Ocean County, New Jersey.]

Nat. Ord. OPHIOGLOSSACEÆ.

BOTRYCHIUM.

B. virginicum, Swartz.—Barren branch sessile, attached above the middle of the main stem, thin, delicate, veiny, tripinnate, lobes of the pinnules deeply incised; fertile branch bi- or slightly tri-pinnate. Very variable in size, usually a foot or more in height, but sometimes only a few inches. *Botrychium virginicum*, Swartz, A. Gray, J. Sm. *B. virginianum*, Schk. *Osmunda virginica*, Linn. Sp. Pl. *Botrypus virginicus*, Michx.—Not uncommon in the woods about Kingston and the surrounding country, as near Odessa, in Hinchinbrook, &c.; Delta; Toronto; Sulphur Spring, Hamilton, Judge Logie; Prescott, in woods, common, B. Billings, jr.; Nicolet, Montreal, Wolfe Island and Chippawa,

P. W. MacLagan, M.D.; Belleville, rich woods, very common, J. Macoun; Ramsay, Rev. J. K. McMorine, M.A.; River Marcouin, St Lawrence Gulf, also opposite Grand Island, Lake Superior, R. Bell, jr., C.E.; Marston, Riviere Rouge, and De Salaberry, west line, W. S. M. D'Urban; Montreal, Osnabruck, and Prescott Junction, Rev. E. M. Epstein; Hill Portage above Oxford House, Governor M'Tavish; Newfoundland, Miss Brenton, in Fl. Bor. Am.; Lake Huron to Saskatchewan, Hook. Fl. Bor. Am.; Gaspé, John Bell, B.A.; Stanfold, M. L'Abbé Provancher; Grenville, C. E., J. Bell; London, W. Saunders.

B. gracile.—Very small (5 or 6 inches high), fertile branch less divided. *B. gracile*, Pursh. Hill Portage, above Oxford House, Governor M'Tavish.

γ. simplex.—Barren branch oblong, pinnatifid, the lobes ovate, incised, veiny. *B. simplex*, Hitchcock. Grenville, C.E., John Bell, B.A.

B. lunarioides, Swartz.—Barren branch long-stalked, arising from near the base of the main stem, thick and leathery, bipinnate, the pinnules slightly crenate; fertile branch bipinnate. Root of long thick tuber-like fibres. *Botrychium lunarioides*, Swartz. Gray. *B. fumarioides*, Willd., Provancher. *Botrypus lunarioides*, Michx.—Gananoque Lake, May 1861; Plains near Castleton, and woods near the Hop Garden, Belleville, rare, J. Macoun; Three Rivers, C.E., P. W. MacLagan, M.D.; Waste places west from Prescott Junction, rare, B. Billings, jr.; St Joachim, Provancher; L'Original, J. Bell; English's Woods, W. Saunders; in the Northern States this species grows in dry rich woods, "mostly southward," according to Professor Gray's Manual.

B. obliquum (Muhl.), appears to be chiefly distinguished by its larger size, more compound fertile frond, and the narrower oblique divisions of the barren one. *B. obliquum* (Muhl.), Pursh. Fl. Amer. Sept., vol. ii. p. 656. Newfoundland, Dr Morrison in Hook. Fl. Bor. Am.; "Wesleyan Cemetery, London," W. Saunders.

B. Lunaria, Swartz.—Barren branch sessile, arising from the middle of the stem, thick and leathery, oblong, pinnate; pinnæ lunate or fan-shaped, slightly incised on the rounded margin. *Botrychium Lunaria*, Swartz, Schk., Hook., Moore, J. Sm. *Osmunda Lunaria*, Linn.—Nipigon, 1853, Governor M'Tavish; N.E. America, Dr Hooker's tab.; Newfoundland, Saskatchewan, and Rocky Mountains to Behring's Bay in N. W. Am., T. Moore, Hbk. Brit. Ferns.

OPIHOGLOSSUM.

[*O. vulgatum*, L., which is widely distributed throughout Europe and Northern Asia, and grows also in the Northern United States, although there "not common," is to be looked for in Canada. In one of its forms (*O. reticulatum*, Linn.), it extends to the West Indies.]

Nat. Ord. LYCOPODIACEÆ.*

PLANANTHUS.

P. Selago, Pallisot-Beauvois.—Stem dichotomously branched, erect,

* In this order the arrangement of A. M. F. J. Pallisot-Beauvois is adopted, as it seems to afford the best basis for a readjustment of the genera of *Lycopodiaceæ*, which is much required. For P.-B.'s genus *Lepidotis*, I have thought it better to substitute the name *Lycopodium*, an old name that should not be discarded.

fastigiate; leaves in about 8 rows, more or less convergent or spreading, lanceolate, acuminate, entire; sporangia in the axils of the common leaves (not in spikes). *Lycopodium Selago*, Linn., E. B., Bigelow, Beck, Hook. and Grev., Torrey Fl. N. Y. ii. p. 508, Gray.—Labrador, Hudson's Bay to Rocky Mountains, Hook. Fl. B. A.; shore of Lake Superior and northward, Professor A. Gray, Man. Bot., N. S., p. 603. I have not seen Canadian specimens of this plant. The stations known show that it encircles Canada, and some of them are probably within our limits. Principal Dawson obtained the alpine variety on the White Mountains, Herb. Bot. Soc. Canada. It is a rare plant in the United States. There are two forms of this species (both of which are figured by Dillenius). *a. sylvaticus*, leaves convergent, almost appressed. *β. alpinus*, leaves widely-spreading, stems shorter.

P. lucidulus. Stem dichotomously divided into long erect branches; leaves bright green, in about 8 rows, reflexed, linear-lanceolate, acute, denticulate; sporangia in the axils of the common leaves (not in spikes). *Lycopodium lucidulum*, Michaux, Pursh, Bigelow, Torr. Fl. N. Y. ii. p. 508, Gray, Beck, Darlington, Hook. and Grev. Bot. Mis. *L. reflexum*, Schk. *Lycopodium suberectum* of Lowe, a Madeira plant. *Selago americana, foliis denticulatis reflexis*, Dill. Hist. Mus. t. lvi.—Gananogue Lakes, Collins's Bay, Newboro on the Rideau, woods in rear of Kingston, &c.; Prescott, common, B. Billings, jr.; Nicolet, C.E., St Catherine's and Grantham, P. W. MacLagan, M.D.; Belleville, in swamps and cold woods, rather common, J. Macoun; River Ristigouche, St Lawrence Gulf, R. Bell, jr., C.E.; L'Orignal, J. Bell, B.A.; London, W. Saunders; Ramsay, Rev. J. K. M'Morine, M.A. This species is stated by Professor Torrey to be rather common in New York State. "Frequently bears bulbs instead of capsules," Pursh.

[*P. alopecuroides*, P. Beauv.—The habitat "Canada" is given for *Lycopodium alopecuroides*, Linn., in the "Species Plantarum," ed. 3, vol. ii, p. 1565; but it is probably not a Canadian plant.]

P. inundatus, P. Beauv.—Stems prostrate, adherent to the soil, the fertile ones erect; leaves secund, yellowish green, lance-awl-shaped, acute; sporangia in distinct, terminal, leafy, sessile, solitary spikes. *Lycopodium inundatum*, Linn., E.B., Michaux, Pursh, Beck, Tuckerman, Torr. Fl. N. Y. ii. p. 508, Gray. *Plananthus inundatus*, Beauv. *L. alopecuroides*, Linn., in part?—In cedar swamps and overflowered woods, Canada, Pursh. Professor Torrey notices its occurrence in the north-western part of the State of New York. Professor Gray observes, that the leaves are narrower in the American than in the European plant, and suggests that it may be a distinct species. I have not yet seen Canadian specimens.

LYCOPODIUM.

L. clavatum, Linn.—Stems robust, and very long, prostrate, rooting, forked, with short ascending branches; leaves pale, incurved, linear-awl-shaped, tipped with a white hair point; sporangia in scaly catkins, which are usually in pairs on common peduncles. *Lycopodium clavatum*, Linn., E. B., Michaux, Pursh, Bigelow Beck, Darlington, Spring, Hook., Torrey, Gray. *L. tristachyum*, Pursh? *L. integrifolium*, Hook. *L. aristatum*, Humboldt.—Occasionally found in the woods in rear of

Kingston, but not common; Newfoundland, Hook. Fl. Bor. Am.; between Thessalon and Mississauga Rivers, Lake Huron, R. Bell, jr.; Prescott, common, B. Billings, jr.; Three Rivers, Temiscouata, and Wolfe Island, P. W. MacLagan, M.D.; Seymour, in pine woods, rare, J. Macoun; Ramsay, Rev. J. K. McMorine, M.A.; River Ristigouche, St Lawrence Gulf, R. Bell, jr.; London, W. Saunders, C.E.; L'Original, Anse au Cousin, Gaspé, J. Bell; Belmont. The spores, chiefly of *L. complanatum*, constitute *pulvis lycopodii*, which is used by apothecaries, and was at one time employed for making artificial lightning in the theatres.

L. annotinum, Michaux.—Stems very long, prostrate, creeping, forked, with ascending branches; leaves bright green, spreading or slightly deflexed, in about five rows, linear-lanceolate, mucronate, serrulate; sporangia in scaly catkins, which are sessile, solitary, oblong-cylindrical, thick. *Lycopodium annotinum*, Michaux, E. B., Pursh, Beck, Tuckerman, Torrey, Fl. New York State, ii. p. 509.—Pine forests in Hinchinbrook; rocky woods in Pittsburg, on the north bank of the St Lawrence, near Kingston; Gananoque Lakes; L'Anse au Cousin, Gaspé, John Bell, B.A.; Prescott, common, B. Billings, jr.; Rivière du Loup, Nicolet, Montreal, and Kingston, P. W. MacLagan, M.D.; Belleville, in cool woods, common, J. Macoun; Ramsay, Rev. J. K. McMorine, M.A.; Priceville, C. I. Cameron, B.A.; Newfoundland, Hook. Fl. Bor. Am.; St Augustin and Cap Tourmente, M. L'Abbé Provancher. Frequent in New York State, according to Professor Torrey. Of this species there are two forms, only one of which, the normal one, or type, I have as yet observed in Canada. The var. β *alpestre*, Hartm. Scan. Fl., having broader, shorter, paler, less spreading leaves, I have from the Dovrefieldt (T. Anderson, M.D.), Lochnagar (A. Croall), and entrance to Glen Fee, Clova, where I found it growing with the typical form.

L. dendroideum, Michx.—Stems upright, bare below, bushy above (giving the plant a tree-like aspect), arising from a long creeping rhizome, leaves more or less appressed; sporangia, in scaly catkins, which are sessile, cylindrical. *Lycopodium dendroideum*, Michx., Pursh, Bigelow, Hook., Beck, Darlington. *L. obscurum*, Linn., Bigelow, Oakes.—White cedar woods near Bath, abundant, and throughout the woods generally in rear of Kingston; Gananoque River; Priceville, C. I. Cameron, B.A.; Prescott, common, B. Billings, jr.; Nicolet, Mount Johnson, and Montreal, P. W. MacLagan, M.D.; Seymour and Cramahe, in cold moist woods, J. Macoun; River Ristigouche, Gulf of St Lawrence, R. Bell, jr.; Ramsay, Rev. J. K. McMorine, M.A.; New Brunswick, Hook. F. B. A.; Osnabrock and Prescott Junction, Rev. E. M. Epstein; London, W. Saunders; Harrington, L'Original, and Gaspé, John Bell, B.A.; St Joachim, M. L'Abbé Provancher.

L. complanatum, Linn.—Stems rhizome-like with ascending branches, which are dichotomously divided, flattened; leaves short, in four rows, of two rows imbricated, appressed, of the other two somewhat spreading; sporangia in scaly cylindrical catkins, in twos, threes, or fours, on a common peduncle. *Lycopodium complanatum*, Linn., Gray, Blytt. *L. chamaecyparissias*, Braun. *L. sabinæfolium*, Willd.—Not uncommon in the woods about Kingston, and in rear; Newboro-or-the Rideau; Gananoque River; River Ristigouche, St Lawrence Gulf, and St Joseph's Island opposite Campment D'Ours, Lake Huron, R. Bell,

jr.; Ramsay, Rev. J. K. M'Morine, M.A.; pine grove near Blue Church Cemetery and woodlands west from Brockville, not common, B. Billings, jr.; Three Rivers and Temiscouata, C.E., P. W. MacLagan, M.D.; sandy woods around Castleton, sterile hills Brighton and Murray, J. Macoun; L'Orignal and L'Anse au Cousin, Gaspé, J. Bell, B.A.; Trois Pistoles, M. L'Abbé Provancher; London, W. Saunders. To this species is referred *L. sabinaefolium*, Willd., *L. chamæcyparissias*, A. Braun, with branches more erect and fasciated. Professor Asa Gray remarks:—"The typical form of *L. complanatum*, with spreading, fan-like branches, is abundant southern (in N. States), while northward it passes gradually into var. *sabinaefolium*." I have only one rather imperfect specimen of the European *L. chamæcyparissias*, collected at Bonn, on the Rhine, by my friend Professor G. S. Blackie, which does not differ in the branching from ordinary Canadian forms of *L. complanatum*. It appears to be quite a common species in the States, for I have it from a great many places.

SELAGINELLA.

S. spinulosa, A. Braun.—Small, prostrate, leaves lanceolate, acute, spreading, spinosely toothed; fertile branch stouter, ascending spike sessile. *Selaginella spinulosa*, A. Braun, Blytt, Norges Fl. *Lycopodium selaginoides*, Linn., Pursh Fl. Am. Sept. ed. ii. p. 654. *Selaginella spinosa*, Beauv. *Selaginella selaginoides*, A. Gray, Man. Bot. N. States, p. 605.—Gaspé, John Bell, B.A.; Canada, Michaux; Lake Superior and northward, pretty rare, Professor Asa Gray in Man. Bot. N. States; Canada, Pursh, who observes: "The American plant is smaller than the European."

STACHYGYNANDRUM.

S. rupestre, P. Beauv.—Much branched, leaves slightly spreading when moist, appressed when dry, carinate, hair-tipped; compact and moss-like, growing on bare rocks. *Selaginella rupestris*, Spring, A. Gray, Eaton. *Lycopodium rupestre*, Linn., Pursh Fl. Am. Sept. ed. ii. p. 654.—On the perpendicular faces of Laurentian rocks, along the north bank of the St Lawrence, in Pittsburg, and on the Thousand Islands at Brockville, &c.; Longpoint on the Gananoque River; near Farmersville, C. W., T. F. Chamberlain, M.D.; rocks in pine groves two miles west from Prescott, near the river, and on rocks west from Brockville, not common, B. Billings, jr.; Ramsay, Rev. J. K. M'Morine, M.A.; Beloeil and Mount Johnson, C.E., P. W. MacLagan, M.D.

DIPLOSTACHYUM.

D. apodum, P. Beauv.—Stems creeping, branched; leaves pale vivid green, of two kinds,—the larger spreading horizontally, ovate-oblique, the smaller appressed, acuminate, stipule-like. Forms compact tufts. *Lycopodium apodum*, Linn., Pursh Fl. Am. Sept. ed. 2, ii. p. 654. *Selaginella apus*, Gray, Eaton.—Abundant on low wet ground east of Front Street, Belleville, below the hill, where it was pointed out to me by Mr J. Macoun, July 1863. In September 1863, I found it sparingly but fertile, on grassy flats by the river side at Odessa. Near London,

W. Saunders; Detroit River, C. W., P. W. MacLagan, M.D. Apparently not common in the United States. I have it from Schooley's Mountains. This is a very small, compactly-growing moss-like species, well adapted for cultivation under a glass shade. It was a great favourite with the late Dr Patrick Neill, in whose stove, at Canonmills, Edinburgh, I first saw it many years ago.

Nat. Ord. MARSILEACEÆ.

AZOLLA.

A. Caroliniana, Willd.—Pinnately branched with cellular, imbricated leaves; plant reddish, circular in outline, $\frac{1}{2}$ –1 inch in diameter; leaves ovate obtuse, rounded and roughened on the back (Eaton). Resembles a floating moss or *Jungermannia* (Torrey). Gray, Man. Bot., t. 14. Floating on the waters of Lake Ontario, Pursh Fl. Am. Sept., ed. 2, ii. p. 672. In the adjoining states, Professor Asa Gray notices it as occurring in pools and lakes, New York to Illinois and southward, and observes that it is probably the same as *A. magellanica* of all South America.

SALVINIA.

[*Salvinia natans* = *Marsilea natans*, Linn. Sp. Pl. "Floating like lemna on the surface of stagnant waters, in several of the small lakes in the western parts of New York and Canada."—Pursh Fl. Am. Sept. ed. 2, ii. p. 672. Professor Asa Gray states, that it has not been found by any one except Pursh, and he therefore omits it from his Manual of Botany of the Northern States.]

ISOETES.

I. lacustris, L.—Beloeil, C. E., P. W. MacLagan, M.D.; Saskatchewan, Hook. Fl. Bor. Am. This plant is spoken of by Pursh as growing in the Oswego River, near the Falls; and Professor Gray and others allude to it as not rare in the New England States. It should be carefully looked for in the numerous lakes and creeks of Upper Canada. It grows in muddy bottoms, forming green meadows under water. Much interest is attached to the genus *Isoetes*, since Professor Babington has shown that instead of one there are many species, or at least distinct races or forms, in Britain. In the United States four are known:—*I. lacustris*, Linn.; *I. riparia*, Engelm.; *I. Engelmanni*, Braun; and *I. flaccida*, Shuttlew., the last a southern form. Professor Babington is certain of the existence of at least eight European species:—*I. lacustris*, L.; *I. echinospora*, Dur.; *I. tenuissima*, Bor.; *I. adspersa*, A. Br.; *I. setacea*, Del.; *I. velata*, Bory.; *I. Hystrix*, Dur.; and *I. Duriei*; Bory. As yet we know of only one Canadian species, which is here rendered, rather uncertainly, *I. lacustris*. The American species are described in Gray's Manual, the British ones in the new Journal of Botany, London.

Nat. Ord. EUISETACEÆ.

EUISETUM.

The *Equiseta* having been described in a previous paper, it will be sufficient to give here a mere list of the species, with some additional notes obtained since the former paper was written.

32 *Synopsis of Canadian Ferns and Filicoid Plants.*

E. sylvaticum, Linn. Newfoundland and New Brunswick, Hook. Fl. Bor. Am.

E. sylvaticum, β . *capillare*. Much branched; branches very long straight, and exceedingly slender (capillary). Farmersville.

E. umbrosum, Willd. Belmont.

E. arvense, Linn. West from London, W. Saunders. The rhizome bears large spherical pill-like nodules, which are, however, more conspicuous in var. β . *granulatum*.

E. arvense, β . *granulatum*.

E. Telmateja, Ehrhart. Shores of Lake Ontario, Beck.

E. limosum, Fries.—The great value of this species and of *E. arvense* as fodder plants, is confirmed. On the western prairies horses are said to get "rolling fat" on *Equisetum* in ten days; and experienced travelers tell me, that their horses always go faster next day after resting at night on *Equisetum* pasture. The horses do not take to it at first; but after having a bit of *Equisetum* put occasionally into their mouths, they soon acquire a liking for it, and prefer it to all other herbage. Near Komoka, W. Saunders.

E. hyemale, Linn. Lake Huron, Hook. Fl. Bor. Am.; St Joachim, M. L'Abbé Provancher; London, W. S.

E. robustum, Braun. Stems much thicker than in *E. hyemale*, the ridges with one line of tubercles; sheaths shorter than broad, with a black band at base, and a less distinct one at the margin; teeth about forty, three-keeled. *E. robustum*, Braun, A. Gray. Grenadier Pond, on the Humber River near Toronto, 3d June 1862. It is difficult to decide whether this and other forms are really distinct from *E. hyemale*; certainly that species varies in size, in roughness, and other characters. In *robustum* the teeth are twice as many as in *hyemale*, but even this is perhaps not a constant character.

E. variegatum, Weber and Mohr.; St Joachim, M. L'Abbé Provancher.

E. scirpoides, Michaux.

E. scirpoides, β . *minor*.

E. palustre, Linn.—"Canada, from Lake Huron, Dr Todd, Mr Cleg-horn, Mrs Percival, to the shores of the Arctic Sea, Dr Richardson, Drummond, Sir John Franklin, Captain Back."—Hook. Fl. Bor. Amer. Professor A. Gray speaks of "the European *E. palustre*," "attributed to this country (the N. American States) by Pursh, probably incorrectly." Dr Hooker indicates its existence, without doubt, in Arctic West America and Arctic East America. The name of the plant has occasionally appeared in Canadian lists, but I have as yet seen no Canadian specimen. It remains for Canadian or Hudson's Bay botanists to trace its southern limit on the American Continent. In Europe and Asia it has no tendency to Arctic limitation.

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